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Attorneys for Plaintiff SEMICAPS Pte Ltd

**UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF CALIFORNIA**

SEMICAPS Pte Ltd,

Plaintiff,

v.

Hamamatsu Photonics K.K., Hamamatsu
Corporation, and Photonics Management
Corp.,

Defendants.

Case No. 3:17-cv-03440

COMPLAINT FOR PATENT
INFRINGEMENT

JURY TRIAL DEMANDED

1 Plaintiff SEMICAPS Pte Ltd (UEN: 199404078Z) (“Plaintiff” or “SEMICAPS”), by and
2 through its attorneys, brings this complaint against Defendants Hamamatsu Photonics K.K.,
3 Hamamatsu Corporation, and Photonics Management Corp. (collectively, “Defendants” or
4 “Hamamatsu”) and alleges the following:

5 INTRODUCTION

6 1. This is an action for patent infringement arising under the patent laws of the
7 United States, 35 U.S.C. § 1 et seq., specifically including 35 U.S.C. § 271(a), (b), and (c).

8 THE PARTIES

9 2. Plaintiff SEMICAPS is a corporation organized under the laws of Singapore, with
10 a principal place of business at 28 Ayer Rajah Crescent, #03-01 Singapore 139959.

11 3. On information and belief, Defendant Hamamatsu Photonics K.K. is a Japanese
12 company and has its principal place of business at 325-6 Sunayama-cho, Naka-ku, Hamamatsu
13 City, Shizuoka Pref., 430-8587, Japan.

14 4. On information and belief, Defendant Hamamatsu Corporation is incorporated
15 under the laws of New Jersey and has its principal place of business at 360 Foothill Road,
16 Bridgewater, NJ 08807.

17 5. On information and belief, Defendant Photonics Management Corp. is
18 incorporated under the laws of Delaware and has its principal place of business at 360 Foothill
19 Road, Bridgewater, NJ 08807.

20 JURISDICTION AND VENUE

21 6. SEMICAPS hereby restates and re-alleges the allegations set forth in paragraphs 1
22 through 3 above as if fully set forth herein.

23 7. This Court has subject matter jurisdiction under 28 U.S.C. §§ 1331 and 1338(a).

24 8. On information and belief, Hamamatsu maintain and/or maintained offices in the
25 Northern District of California at 2875 Moorpark Avenue, San Jose, CA 95128 and at 1700 Dell
26 Avenue, Campbell, CA 95008.

27 9. The Court has personal jurisdiction over Hamamatsu pursuant to due process and
28 the California Long Arm Statute, due at least to its continuous business contacts in the State of

California and in this District, including committing acts of patent infringement within the State of California and this District at either one or both of its offices in the Northern District of California and as alleged below. On information and belief, Hamamatsu has committed at least one act of infringement in the Northern District of California by selling infringing product(s) to customers in this District. Hamamatsu has also purposefully directed its business activities to this State and this District. Hamamatsu directly or through intermediaries (including distributors, retailers, and others) ships, distributes, offers for sale, sells, and advertises its products infringing the asserted patent, described below, in the United States, the State of California, and this District. For example, on information and belief, Hamamatsu maintains a Western Regional Sales Office in this District. Hamamatsu also aids, abets, or contributes to the infringement of third parties in this District.

10. Venue is proper in this judicial district under 28 U.S.C. § 1400 because Hamamatsu has committed acts of infringement and has a regular and established place of business in this District.

THE PATENT-IN-SUIT

11. U.S. Patent No. 7,623,982 (“’982 patent”), titled “Method of Testing an Electronic Circuit and Apparatus Thereof,” was issued by the United States Patent and Trademark Office on November 24, 2009. SEMICAPS is the owner by assignment of the ’982 patent, including the sole and undivided right to sue for infringement and to collect damages for past and future infringement. A true and correct copy of the ’982 patent is attached hereto as **Exhibit A**.

COUNT I: PATENT INFRINGEMENT OF THE ’982 PATENT

12. SEMICAPS hereby restates and re-alleges the allegations set forth in paragraphs 1 through 9 above as if fully set forth herein.

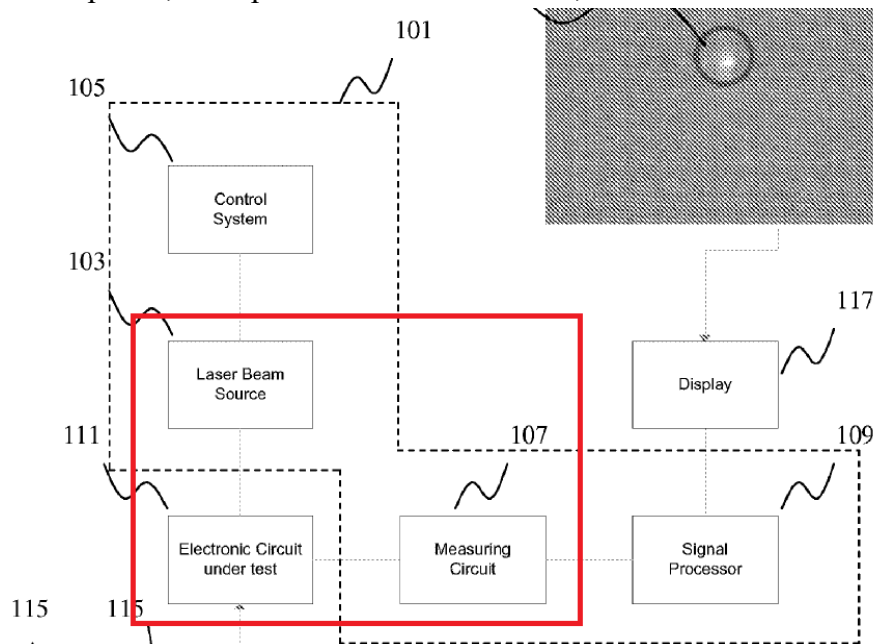
13. Hamamatsu infringes at least claims 4-7 and 21-25 of the ’982 patent, either literally or under the doctrine of equivalents, by making, using, selling, offering to sell, and/or importing into the United States Hamamatsu’s M10383 Digital Lock-in Kit (“M10383”) as described in the M10383 technical note attached as **Exhibit B**, testing equipment incorporating

or retrofitted to include the M10383, and other technology that incorporates the infringing aspects of the M10383 as described herein (the “Accused Products”).

14. The testing equipment incorporated or retrofitted to include the M10383 includes iPHAMOS, THEMOS-1000, and μ AMOS-200. *See* Ex. B at 2.

15. Hamamatsu’s PHEMOS and iPHAMOS Series of Emission Microscopes using OBIRCH for semiconductor failure analysis compete with SEMICAPS’ Scanning Optical Microscopes (“SOM”), for instance the SOM 1100, SOM 3000, and the SOM 4000. The PHEMOS Series is described in Hamamatsu’s PHEMOS Series General Catalogue attached hereto as **Exhibit C**.

16. The ’982 patent relates to testing of electronic circuits using a laser. *See* Ex. A at 2:3-10. Such testing involves exciting an electronic circuit using a laser beam and measuring the response using measuring circuitry. An exemplary embodiment of such a test apparatus is shown in Fig. 1 of the ’982 patent, excerpted and annotated in red, below.



Ex. 1 at Fig. 1.

17. One exemplary testing technique to which the invention applies is Optical Beam Induced Resistance Change (“OBIRCH”) analysis. *See id.* at 1:22-24.

18. As set forth below, the Accused Products infringe claims 4-7 and 21-25 of the ’982 patent.

19. Claims 4-7 depend from claim 1. Claim 1 of the '982 patent recites as follows:

1. A method of testing an electronic circuit, comprising:

radiating a laser beam onto the electronic circuit,

determining a plurality of samples of a response signal output by the

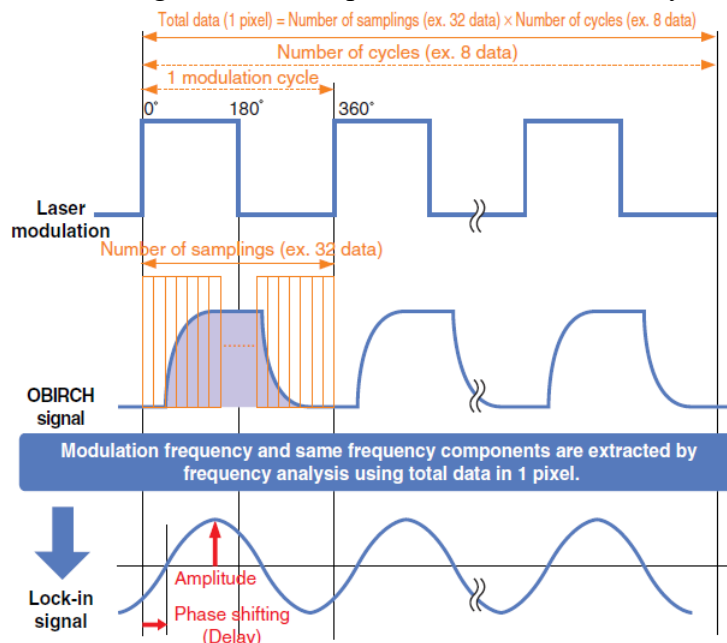
electronic circuit during the period when the laser beam is radiated,

accumulating the plurality of samples to generate a value, and

generating a test result based on the value.

20. The Accused Products perform a method that includes radiating a laser beam onto an electronic circuit. The Accused Products are used in OBIRCH analysis, which uses an “optical beam” (e.g., a laser beam) to induce a resistance change on an electric circuit. *See, e.g.*, Ex. B at 1. (“The M10383 Digital lock-in kit is a new function added to OBIRCH analysis...”); Ex. C at 7 (“Principle of OBIRCH Analysis”).

21. The Accused Products perform a method that includes determining a plurality of samples of a response signal output by the electronic circuit during the period when the laser beam is radiated. For example, as shown in the figure below from the M10383 technical note, the Accused Products determine a plurality of samples of the “OBIRCH” signal during the period when the laser is radiated during half of the depicted laser modulation cycle.



Ex. B at 1; *see also id.* (“When data within one modulation cycle is divided by the number of

1 samplings, one pixel is subdivided into data elements that equal the ‘number of samplings x
2 modulation cycle.’ For example, *if the number of samplings per cycle is 32* and the number of
3 modulation cycles is 8, then one pixel will be subdivided into 256 data elements.”) (emphasis
4 added).

5 22. The Accused Products perform a method that includes accumulating a plurality of
6 samples to generate a value. According to the M10383 technical note, the Accused Products’
7 accumulate samples of the OBIRCH signal so that their software may “utilize[] this sub-divided
8 data to frequency-analyze each pixel and create a lock-in detection image.” Ex. B at 1; *see also*
9 *id.* (“Note: The larger the number of cycles, the lower the noise.”).

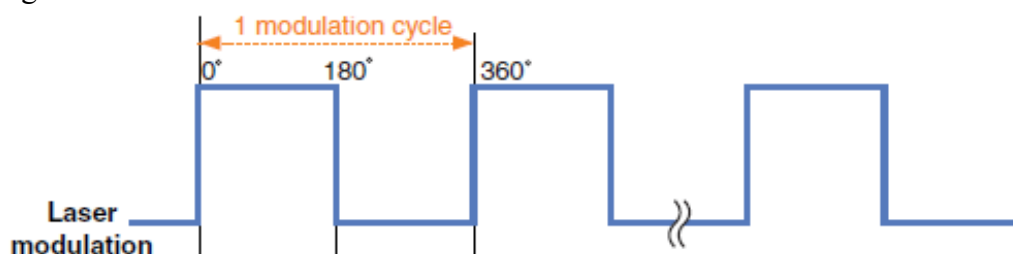
10 23. The Accused Products perform a method that includes generating a test result at
11 least based on their nature as test equipment.

12 24. As set forth below, the Accused Products infringe claim 4 of the ’982 patent.

13 25. Claim 4 of the ’982 patent recites as follows:

14 4. The method of claim 1, wherein the laser beam is a pulsed laser beam.

15 26. The Accused Products perform the method of claim 1 using a pulsed laser beam.
16 For example, as shown in the figure below from the M10383 technical note, the laser is
17 modulated during testing. “Modulation” as used in the M10383 technical note is or is equivalent
18 to “pulsing.”



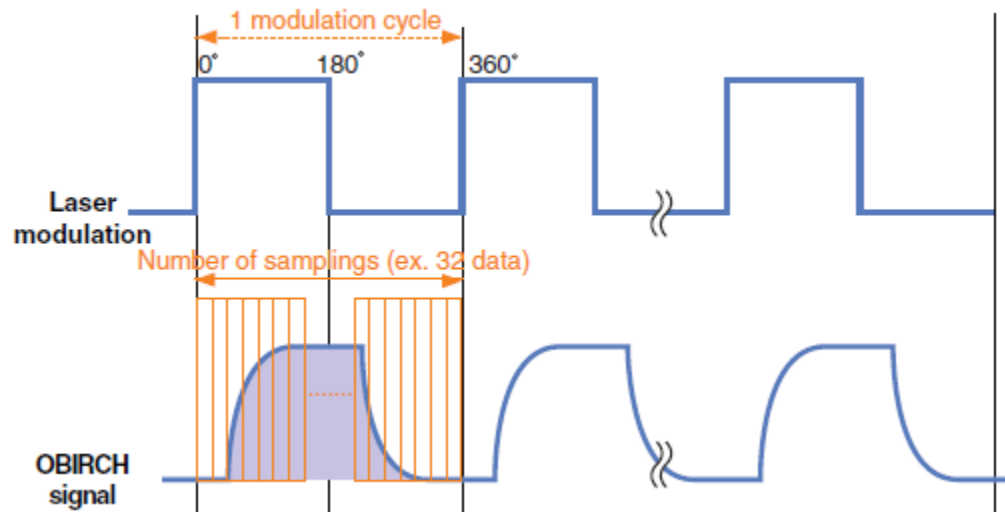
23 27. As set forth below, the Accused Products infringe claim 5 of the ’982 patent.

24 28. Claim 5 of the ’982 patent recites as follows:

25 5. The method of claim 4, wherein the frequency of sampling of the response
26 signal is higher than the frequency of the pulsed laser beam.

27 29. The Accused Products perform the method of claim 4 wherein the frequency of
28 sampling of the response signal is higher than the frequency of the pulsed laser beam. For

example, as shown in the figure below from the M10383 technical note, the advertised example takes 32 samples during a single modulation cycle of the laser.

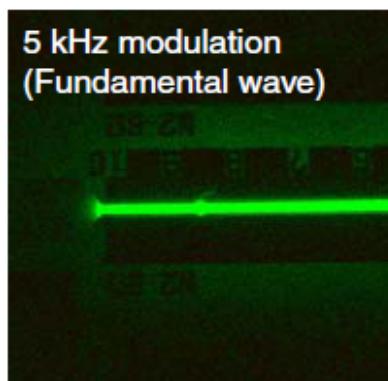


30. As set forth below, the Accused Products infringe claim 6 of the '982 patent.

31. Claim 6 of the '982 patent recites as follows:

6. The method of claim 4, wherein the frequency of the pulsed laser beam is in the range from about 50 Hz to about 50 kHz.

32. The Accused Products perform the method of claim 4 wherein the frequency of the pulsed laser beam is in the range from about 50 Hz to about 50 kHz. For example, as shown in the figure below from the M10383 technical note, the advertised example uses a 5kHz laser modulation, which is between 50 Hz and 50 kHz.



33. As set forth below, the Accused Products infringe claim 7 of the '982 patent.

34. Claim 7 of the '982 patent recites as follows:

7. The method of claim 4, wherein the frequency of sampling of the response signal is in the range from about 100 kHz to about 80 MHz.

1 35. The Accused Products perform the method of claim 4 wherein the frequency of
2 sampling the response signal is in the range from about 100 kHz to about 80 MHz. As
3 demonstrated above, the M10383 technical note contemplates a laser modulation frequency of
4 5kHz and a sampling frequency that is 32 times higher, or 160 kHz, which is between 100 kHz to
5 about 80 MHz.

6 36. As set forth below, the Accused Products infringe claim 21 of the '982 patent.

7 37. Claim 21 of the '982 patent recites as follows:

8 21. An apparatus, comprising:

9 a laser beam source, wherein the laser beam source radiates a laser beam
10 onto the electronic circuit,

11 a control system operable to direct the laser beam source to dwell on a
12 location on the electronic circuit,

13 a measuring circuit, wherein the measuring circuit determines a plurality
14 of samples of a response signal output by the electronic circuit
15 during the period when the laser beam is radiated, and

16 a signal processor, wherein the signal processor accumulates the plurality
17 of samples to generate a value, and generates a test result based on
18 the value.

19 38. The Accused Products comprise a laser beam source, wherein the laser beam
20 source radiates a laser beam onto the electronic circuit. For example, the PHEMOS Series
21 General Catalog states that in OBIRCH analysis, "the surface of a chip is scanned with an
22 infrared laser." Ex. C at 7.

23 39. The Accused Products comprise a control system operable to direct the laser beam
24 source to dwell on a location on the electronic circuit. For example, the M10383 technical note
25 describes generating images comprised of pixels, whereby each pixel is generated as a result of
26 multiple laser modulation cycles on the pixel location. *See* Ex. B at 1.

27 40. The Accused Products comprise a measuring circuit, wherein the measuring
28 circuit determines a plurality of samples of a response signal output by the electronic circuit

1 during the period when the laser beam is radiated. For example, the Accused Products include a
 2 measuring circuit at least to sample the OBIRCH signal. *See* Ex. B at 1.

3 41. The Accused Products comprise a signal processor, wherein the signal processor
 4 accumulates the plurality of samples to generate a value, and generates a test result based on the
 5 value. For example, software running on a processor uses each sample taken during a number of
 6 laser modulation cycles to “frequency-analyze each pixel and create a lock-in detection image.”
 7 Ex. B at 1.

8 42. As set forth below, the Accused Products infringe claim 22 of the ’982 patent.

9 43. Claim 22 of the ’982 patent recites as follows:

10 22. The apparatus of claim 21, wherein the control system is operable to move the
 11 laser beam source according to a pattern over a plurality of locations on the
 12 electronic circuit.

13 44. The Accused Products comprise a control system that is operable to move the
 14 laser beam source according to a pattern over a plurality of locations on the electronic circuit.
 15 For example, the laser beam source moves at least to scan all parts of the circuit to generate an
 16 image of circuit faults.

17 45. As set forth below, the Accused Products infringe claim 23 of the ’982 patent.

18 46. Claim 23 of the ’982 patent recites as follows:

19 23. The apparatus of claim 21, wherein the laser beam is a pulsed laser beam.

20 47. The Accused Products include a pulsed laser beam. *See* ¶¶ 22-24, *supra*.

21 48. As set forth below, the Accused Products infringe claim 24 of the ’982 patent.

22 49. Claim 24 of the ’982 patent recites as follows:

23 24. The apparatus of claim 23, wherein the frequency of sampling is higher than
 24 the frequency of the pulsed laser beam.

25 50. The Accused Products include a pulsed laser beam. *See* ¶¶ 22-24, *supra*.

26 51. As set forth below, the Accused Products infringe claim 25 of the ’982 patent.

27 52. Claim 25 of the ’982 patent recites as follows:

28 25. The apparatus of claim 23, wherein the frequency of the pulsed laser beam is

1 in the range from about 50 Hz to about 50 kHz and the frequency of sampling is
2 in the range from about 100 kHz to about 80 MHz.

3 53. The Accused Products include a pulsed laser beam. *See* ¶¶ 22-24, *supra*.

4 54. Hamamatsu or its customers directly infringe at least claims 4-7 and 21-25 of the
5 '982 patent under 35 U.S.C. § 271(a) at least when Hamamatsu, its employees, its customers,
6 and/or end users perform the OBIRCH analysis described in Exhibit B with the Accused
7 Products.

8 55. Hamamatsu indirectly infringes at least claims 1 and 4-7 and 21-25 of the '982
9 patent under 35 U.S.C. § 271(b) because Hamamatsu encourages, facilitates, instructs, aids
10 and/or abets its customers and/or end users to use one or more of the Accused Products in an
11 infringing manner as advertised in the M10383 technical note. Hamamatsu's active inducement
12 of infringement of at least claims 4-7 and 21-25 of the '982 patent includes, *e.g.*, actively and
13 knowingly aiding and abetting persons and/or entities (including Hamamatsu's customers and/or
14 end-users) through activities such as marketing the Accused Products and/or creating and/or
15 distributing instruction materials on the use of Accused Products, with the specific intent to
16 induce others to use the Accused Products in an infringing manner. For example, Hamamatsu's
17 M10383 technical note describes performing an OBIRCH analysis using the Accused Products in
18 an infringing manner. *See* Ex. B.

19 56. Hamamatsu indirectly infringes at least claims 4-7 and 21-25 of the '982 patent
20 under 35 U.S.C. § 271(c) because the Accused Products are especially made or especially
21 adapted for infringement of the '982 patent and are not staple articles or commodities of
22 commerce suitable for noninfringing use.

23 57. Hamamatsu has had knowledge of the '982 patent at least as of June 3, 2014. On
24 that date, Hamamatsu mailed SEMICAPS a letter regarding the '982 patent. A copy of that letter
25 is attached hereto as **Exhibit D**. Hamamatsu indicated that it would "carefully study" the '982
26 patent. *See* Ex. D. Accordingly, Hamamatsu's infringement has been willful since at least June 3,
27 2014, and possibly earlier.

1 58. Despite Hamamatsu's knowledge of and notice of the '982 patent and its ongoing
2 infringement, Hamamatsu continues to manufacture, use, sell, offer for sale, and/or import the
3 Accused Products in a manner that infringes the '982 patent, and continues to produce and
4 disseminate promotional and marketing materials, supporting materials, instructions, and/or
5 technical information related to the infringing aspects of the Accused Products. Hamamatsu
6 lacks a justifiable belief that it does not infringe the '982 patent, or that the '982 patent is invalid,
7 and has acted recklessly in its infringing activity, justifying an increase in the damages to be
8 awarded to SEMICAPS up to three times the amount found or assessed, in accordance with 35
9 U.S.C. § 284.

10 59. At least Hamamatsu's willful infringement of the '982 patent renders this case an
11 exceptional case, justifying an award to SEMICAPS of its reasonable attorneys' fees, in
12 accordance with 35 U.S.C. § 285.

13 60. SEMICAPS has no adequate remedy at law for Hamamatsu's acts of
14 infringement. As a direct and proximate result of Hamamatsu's acts of infringement, SEMICAPS
15 has suffered and continues to suffer damages and irreparable harm. Unless Hamamatsu's acts of
16 infringement are enjoined by this Court, SEMICAPS will continue to be damaged and
17 irreparably harmed.

18 **DEMAND FOR JURY TRIAL**

19 61. Pursuant to Rule 38(b) of the Federal Rules of Civil Procedure, SEMICAPS
20 hereby demands trial by jury of all issues so triable.

21 **PRAYER FOR RELIEF**

22 WHEREFORE, SEMICAPS respectfully requests that this Court enter judgment in its
23 favor and against Hamamatsu as follows:

24 A. a declaration that Hamamatsu has infringed the '982 patent under 35 U.S.C.
25 § 271, and a final judgment incorporating the same;

26 B. a preliminary and permanent injunction, enjoining Hamamatsu and its officers,
27 agents, servants, employees, representatives, successors, and assigns, and all others acting in
28

1 concert or participation with them from continued infringement under 35 U.S.C. § 271 of the
2 '982 patent;

3 C. an award of damages adequate to compensate SEMICAPS for Hamamatsu's
4 infringement of the '982 patent, together with prejudgment and post-judgment interest and costs
5 pursuant to 35 U.S.C. § 284;

6 D. an order finding that Hamamatsu's infringement is willful and enhancing damages
7 pursuant to 35 U.S.C. § 284;

8 E. an order finding that this is an exceptional case under 35 U.S.C. § 285 and
9 awarding relief, including reasonable attorneys' fees, costs, and expenses;

10 F. an accounting of all infringing sales and other infringing acts by Hamamatsu, and
11 an order compelling an accounting for infringing acts not presented at trial and an award by the
12 Court of additional damages for such acts; and

13 G. any other relief to which SEMICAPS is entitled or that the Court deems just and
14 proper.

15 Date: June 14, 2017

By: /s/ David D Schumann

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